DOCUMENT RESUME

ED 067 263 SE 014 710

TITLE	Enrollment Increase in Science and Mathematics in Public Secondary Schools, 1948-49 to 1969-70.
INSTITUTION	National Science Foundation, Washington, D.C.
REPORT NO	NSF-71-30
PUB DATE	15 Oct 71
NOTE	4p.
JOURNAL CIT	Science Resources Studies Highlights; October 15, 1971
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Enrollment; Mathematics Education; Public Schools; *Research; Science Education; *Secondary School Mathematics; *Secondary School Science; *Student Enrollment
IDENTIFIERS	National Science Foundation

ABSTRACT

Results of studies by the Office of Education carried out in 1948-49, 1960-61, and 1969-70 are compared for total enrollment in grades 9 through 12 and for total enrollment in selected science and mathematics courses in grades 9 through 12 in U.S. public secondary schools. The findings showed that the total number of public secondary school students enrolled in science and mathematics in 1969-70 was more than 2.5 times larger than the number enrolled in 1948-49, with largest relative increases reported for enrollments in psychology, economics, and biology. During the same period, total enrollment in grades 9-12 increased 2.3 times. Enrollments for specific courses are included in tables of data. (DT)

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SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION • WASHINGTON, D.C. 20550 • OCTOBER 15, 1971 • NSF 71-30

Enrollment Increase in Science and Mathematics in Public Secondary Schools, 1948-49 to 1969-70

This report has been developed from a sample survey conducted for the National Science Foundation by the Office of Education covering the 1969-70 school year and from earlier studies OE carried out in 1948-49 and 1960-61.

Summary

The total number of public secondary school students enrolled in courses in science and mathematics in 1969-70 was more than 2.5 times larger than the number enrolled in 1948-49. The largest relative increases were reported for enrollments in psychology, economics, and biology. During this same period, total enrollment in grades 9-12 increased 2.3 times (table 1).

Table 1.—*Total enrollment in grades 9 through 12 in U.S. public secondary schools, by grade, selected years*

[Thousands]

Grade	1948-49	1960-61	1969-70
Total enrollment, grades 9-12	5,399	8,219	12,442
Grade 9	1,641	2,442	3,492
Grade 10	1,491	2,119	3,318
Grade 11	1,242	1,912	2,969
Grade 12	1,026	1,746	2,663

Sources: Office of Education and National Science Foundation estimates based on Office of Education data.

Introduction

A technologically oriented society which is becoming more complex should have some knowledge of the important facts of science, an understanding of the methods of scientific inquiry, and an appreciation of the capabilities and the limitations of science and scientists. A measure of the extent, though not of the quality, of familiarity with science is the extent to which people are enrolled in science courses at the secondary school level.

The Office of Education obtained data on such enrollments in science courses for 1948-49 and 1960-61.[1] Limited data collected for more recent years failed to provide definitive comparable information; thus, no comprehensive course enrollment data have been available until the 1969-70 data, which were obtained by the Office of Education at the request of the National Science Foundation.[2]

[1] Office of Education, *Subject Offerings and Enrollments in Public Secondary Schools*, OE-24015-61; *Offerings and Enrollments in High School Subjects, 1948-49*; *Summary of Offerings and Enrollments in High School Subjects, 1960-61* (preliminary report) (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office); unpublished tabulations from a 1969 study of the condition and progress of the educational profession in progress.

[2] See details under Methodology.

Prepared in the Science Education Studies Group, Division of Science Resources Studies

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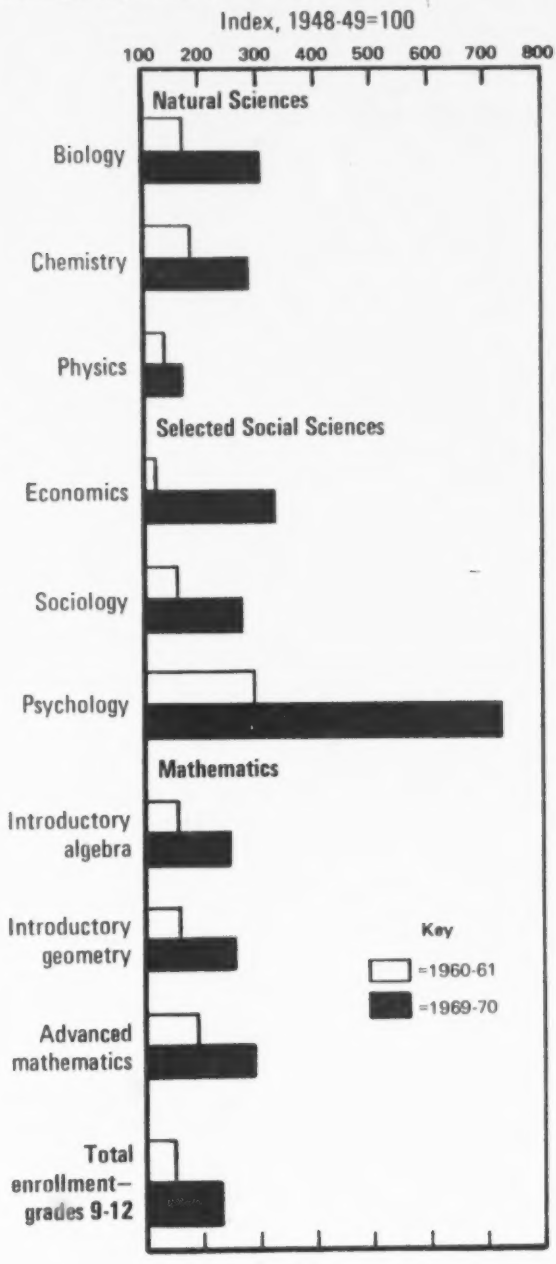
Chart 1.–Public secondary school enrollment in selected courses and total enrollment in grades 9 through 12, 1948-49 to 1969-70



Findings

Secondary school enrollments in selected science and mathematics courses increased sharply during the 20-year period from 1948-49 to 1969-70 (table 2). Enrollments in introductory algebra and introductory geometry, sociology, advanced mathematics, and chemistry were over 2.5 times larger in 1969 than they were in 1948. Enrollments in biology and economics

Table 2.–*Estimated enrollment in selected science and mathematics courses in grades 9 through 12 in U.S. public secondary schools, various years*

[Thousands]

Course	1948-49	1960-61	1969-70
Natural sciences:			
Biology	1,062	1,853	3,197
Chemistry	412	745	1,160
Physics	291	402	482
Earth-space sciences	21	77	a
	(–)	(–)	(1,381)
Other natural and physical sciences[b]	1,158	1,829	a
	(–)	(4,663)	(5,765)
Selected social sciences:			
Economics	255	293	844
Sociology	186	289	495
Psychology	47	140	344
Mathematics:			
Introductory algebra	1,042	1,607	2,627
Introductory geometry	599	960	1,530
Advanced mathematics[c]	609	1,174	1,756
Other mathematics[d]	708	1,433	a
	(–)	(4,805)	(6,594)

[a]For 1969-70, 7th and 8th grade enrollments for these fields cannot be separated from 9th-12th grade enrollments. Figures in parentheses show comparable data for grades 7-12 for years shown.

[b]Includes general science, advanced general and physical sciences, and research.

[c]Includes advanced high school or college math, intermediate and advanced algebra, solid geometry, trigonometry, trigonometry-algebra integrated course, analytical geometry, and calculus.

[d]Includes elementary general math, advanced general math, and (on lower line only) 7th and 8th grade math.

Source: National Science Foundation adapted from Office of Education data.

more than tripled, and psychology enrollments increased almost sevenfold. Among the selected courses, only physics failed to keep pace with total enrollment, increasing by only 66 percent.

Increases in certain selected fields–other mathematics, other natural and physical sciences, general science, and earth-space sciences–can only be inferred as discontinuities in the data obscure the actual growth. However, if it is assumed that changes in enrollments in these fields in grades 9-12 paralleled changes in grades 7-12 between 1960-61 and 1969-70, it appears that the combined enrollments in earth-space science, general science, and other natural and physical sciences were roughly 2.5 times as large in 1969-70 as they had been in 1948-49. Enrollment in other mathematics almost tripled over the same period.

Enrollment in the selected courses also generally increased as a proportion of all secondary school enrollments over the period. These proportions may be considered as indicators of the extent to which the public secondary schools are effectively providing instruction in the selected courses. In each course except physics, a greater proportion of students took the course in 1969-70 than had done so in 1948-49 as shown in table 3. Typically, the proportions increase from 1948-49 to 1960-61 and then either increase or remain constant from 1960-61 to 1969-70. Economics fails to conform to this pattern. In physics a declining proportion is indicated.

Selected courses are typically offered at certain grade levels, as for example, physics is usually a 12th-grade course. The proportions of enrollments in the selected courses at the appropriate grade levels afford measures of the extent to which secondary schools approach the potential for these courses. Table 4 reveals that in every course except physics a greater proportion of the students in the appropriate grade enrolled in the course in 1969-70 than in 1948-49. However, the pattern of steady change from decade to decade is by no means uniform. The greatest growth was in psychology where the proportion almost tripled. In advanced mathematics, the proportion increased between 1948-49 and 1960-61 but did not change significantly between 1960-61 and 1969-70. Conversely, the proportion in economics decreased from 1948-49 to 1960-61 and then almost doubled from 1960-61 to 1969-70. The proportion in sociology remained virtually unchanged over the period. The proportion in physics declined steadily.

Table 3.–*Enrollment in selected science and mathematics courses as a percent of total enrollment in grades 9 through 12 in U.S. public secondary schools, various years*

[Percent]

Course	1948-49	1960-61	1969-70
Natural sciences:			
Biology	20	23	26
Chemistry	8	9	9
Physics	5	5	4
Selected social sciences:			
Economics	5	4	7
Sociology	3	4	4
Psychology	1	2	3
Mathematics:			
Introductory algebra	19	20	21
Introductory geometry	11	12	12
Advanced mathematics	11	14	14

Source: National Science Foundation adapted from Office of Education data.

Table 4.–*Enrollment in selected science and mathematics courses in grades 9 through 12 in U.S. public secondary schools as a percent of total enrollment in the grade in which the course is usually offered, various years*

Course	Grade in which usually offered	1948-49	1960-61	1969-70
		Percent		
Natural sciences:				
Biology	10	71	85	96
Chemistry	11	33	39	39
Physics	12	28	23	18
Selected social sciences:				
Economics	12	25	17	32
Sociology	12	18	17	19
Psychology	12	5	8	13
Mathematics:				
Introductory algebra	9	64	66	75
Introductory geometry	10	40	45	46
Advanced mathematics	11-12	27	32	31

Source: National Science Foundation adapted from Office of Education data.

Conclusions

Enrollments in high school science and mathematics generally increased faster than did total high school enrollment; therefore, proportionately more public secondary school students are taking these courses than before. Enrollments in some areas in which greater interest has been shown recently—such as psychology and economics—have been growing relatively rapidly. Physics enrollments are lagging notably. The steady proportional growth of enrollments in such basic core courses as introductory algebra, introductory geometry, biology, and chemistry indicates a basically healthy state of science interest at the high school level.

Methodology

The data presented here have been developed by the National Science Foundation from data obtained in three Office of Education studies.[3] The first two studies carried out in 1948-49 and 1960-61 obtained data from the principals of a sample of public secondary schools. The methodology of these studies is described in the published reports cited. The 1969-70 study was broadly concerned with the staffing of schools, provision of specialized instruction, and selected topics having to do with the education profession; enrollment data were obtained for the National Science Foundation as an ancillary undertaking. The course breakdown was developed with the advice of the Division of Pre-College Education in Science of the Foundation, which also assisted in the analytical design of the report. The enrollment data presented here are based on replies from the principals of 518 representative secondary or combined schools in the sample. The Office of Education is currently preparing a report on other aspects of the study which will include a detailed methodology and an estimate of possible bias introduced by sampling error. Data from the earlier studies have been reanalyzed by the National Science Foundation and appropriate components have been recombined, separately listed, or eliminated in a manner to yield as close comparability as possible with the data of the 1969-70 study.

[3] See footnote 1.